WHAT IS CLAIMED IS:

1. A method for fabricating patterned ceramic layers on areas of a relief that are arranged essentially perpendicular to a substrate surface, comprising:

providing a semiconductor substrate;

forming relief structures within a top side of the substrate, wherein internal areas are arranged essentially perpendicular to the top side of the substrate;

filling the relief structures with a resist to a relief depth, wherein a resist layer is obtained;

depositing a ceramic layer synthesized from a ceramic material by means of a low temperature ALD method, wherein the low temperature ALD method is performed at a temperature lower than a softening temperature of the resist;

anisotropic etching of the ceramic layer, wherein the ceramic layer remains at the areas arranged perpendicular to the top side of the substrate, and wherein a top side of the resist layer situated below the ceramic layer is at least partially uncovered; and

removing the resist layer.

2. The method in claim 1, wherein the ceramic layer is deposited by a radical-assisted ALD method, in which the semiconductor substrate is arranged in a reaction space and a cycle is carried out, comprising:

introducing a first precursor compound into a reaction space, wherein the first precursor compound is adsorbed on the surface of the substrate;

removing unbound first precursor compound from the reaction space;

introducing a second precursor compound into the reaction space, wherein the second precursor compound is adsorbed on the surface of the substrate; and

removing unbound second precursor compound from the reaction space.

3. The method of claim 3, wherein radicals are produced from at least one portion of a first or a second precursor compound, wherein the radicals react with the precursor compound adsorbed on the substrate surface to form the ceramic material.

4. The method of claim 3, wherein the cycle is repeated until a desired layer thickness of the ceramic layer is reached.

5. The method of claim 3, wherein the radicals are produced by means of a plasma.

6. The method of claim 4, wherein the precursor compound is deposited in a cycle, comprising the following steps:

introducing the precursor compound into the reaction space;

producing radicals from at least one portion of the precursor compound, wherein the radicals react with the precursor compound deposited on the substrate surface; and

removing unbound precursor compound from the reaction space,

wherein the cycle is repeated at least once.

7. The method of claim 4, wherein the ceramic layer is constructed from Al_2O_3.

8. The method of claim 1, wherein the ceramic layer is produced by a catalytic ALD method, wherein the semiconductor substrate is arranged in a reaction space, and a cycle is carried out, comprising:

introducing a first precursor compound into the reaction space, wherein the first precursor compound is adsorbed on the surface of the substrate;

removing excess unbound first precursor compound from the reaction space;

introducing a second precursor compound into the reaction space, wherein the second precursor compound is adsorbed on the surface of the substrate; and

removing unbound second precursor compound from the reaction space, wherein a catalyst is added to at least one precursor compound, wherein the catalyst catalyses the reaction of the first precursor compound with the second precursor compound.

9. The method of claim 8, wherein the catalyst is an aromatic nitrogen base.

10. The method of claim 9, wherein the aromatic nitrogen base is pyridine.

11. The method of claim 8, wherein the ceramic layer is synthesized from SiO_2, Si_3N_4, Al_2O_3 or a combination of these compounds.

12. The method of claim 1, wherein filling the relief structures with a resist to a specific relief depth comprises:

filling the relief structure completely with the resist; and

removing the resist layer to the specific relief depth.

13. The method of claim 1, wherein the resist layer is planarized after the relief has been completely filled with the resist.

14. The method of claim 1, wherein the relief structures comprise high aspect ratio trenches.

15. The method of claim 1, wherein the trenches are functionally processed to produce capacitors.

16. A method for fabricating patterned ceramic layers on areas of a relief that are arranged essentially perpendicular to a substrate surface, comprising:

providing a semiconductor substrate;

forming relief structures within a top side of the substrate, wherein internal areas are arranged essentially perpendicular to the top side of the substrate;

filling the relief structures with a resist to a relief depth, wherein a resist layer is obtained; and

depositing a ceramic layer synthesized from a ceramic material by means of a low temperature deposition method, wherein the low temperature deposition method is performed at a temperature lower than a softening temperature of the resist.

17. The method of claim 16, wherein the low temperature deposition method comprises an ALD method.

18. The method of claim 16, wherein the deposition of the ceramic layer is carried out at a temperature of less than 100 °C.

19. The method of claim 16, wherein a heat treatment step for densifying the ceramic layer is carried out after the removal of the resist layer.

20. A method for fabricating patterned ceramic layers on areas of a relief structure formed within a substrate, comprising:

providing a semiconductor substrate;

forming relief structures within a top side of the substrate;

filling the relief structures with a resist to a relief depth, wherein a resist layer is obtained;

depositing a ceramic layer synthesized from a ceramic material by means of a low temperature ALD method;

anisotropic etching of the ceramic layer, wherein the ceramic layer remains on an inner surface of the relief structure, and wherein a top side of the resist layer situated below the ceramic layer is at least partially uncovered; and

removing the resist layer.